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REPORT OF THE COUNCIL.

Since the last report of the Council eighteen deaths have been reported: — five Resident Fellows, — Robert Amory, Leonard Parker Kinnicutt, Francis Cabot Lowell, Henry Pickering Bowditch, Thomas Wentworth Higginson; seven Associate Fellows, — Cyrus Ballou Comstock, William Price Craighill, William Wirt Howe, Melville Weston Fuller, George Park Fisher, Samuel Franklin Emmons, Charles Otis Whitman; six Foreign Honorary Members, — Friedrich von Recklinghausen, Samuel Henry Butcher, William Huggins, Robert Koch, Maurice Levy, Jacobus Henricus van't Hoff.

HENRY PICKERING BOWDITCH.

AT the death of Henry Pickering Bowditch, on March 13, 1911, there passed away a man who, as soldier, scientist, and public-spirited citizen, had led a life of enviable usefulness and permanent achievement. He was born in Boston April 4, 1840, grandson of Nathaniel Bowditch, the distinguished writer on mathematics and navigation; and son of Ingersoll Bowditch, a merchant honored for integrity and generosity. Through his mother, he was descended from the bold and patriotic Col. Timothy Pickering, Secretary of State under Washington.

At the age of seventeen he entered Harvard College, and after four years of study received the A. B. degree in 1861. In the fall of that year he had begun, in the Lawrence Scientific School, the study of chemistry, but then the needs of his country appealed to him so strongly that he volunteered his services for the War. In November he was appointed second lieutenant of the First Massachusetts Cavalry. From January, 1862, when his regiment was sent to the front, until the close of the conflict, he was in active service. He took part in the battle of Secessionville, and his regiment was in the reserve at Fredericksburg. In June, 1862, he was commissioned first lieutenant, and in May, 1863, captain. Thereafter he was in the battles of Aldie, Culpepper, and Rapidan Station; and at New Hope Church, November 27, 1863, he was shot in the right forearm. During the winter of 1863-64 convalescence from his wound kept him from the field. In February, 1864, he was honorably discharged; but almost immediately he joined the service again, as major in the Fifth Massachusetts Cavalry (colored), and with that regiment entered Richmond April 3, 1865.

Major Henry L. Higginson has recorded his memory of Captain Bowditch as he then appeared, — a handsome, refined, and home-bred looking youth, often reserved and even unbending in his manner, but unflagging in his faithfulness and unflinching in his courage.

Except for the end to be sought, however, service in the army was unpleasant to him, and on June 3, 1865, soon after the close of the War, he resigned his command.

In the autumn of 1865, he resumed his studies at the Lawrence Scientific School and came under the inspiring influence of Professor Jeffries Wyman. Although later that fall he entered the Harvard Medical School, he continued to receive the stimulus of Professor Wyman's instruction by pursuing between terms under that famous teacher's direction the subject of comparative anatomy. In 1866 he received the A. M. degree, and in 1868 was graduated from the Medical School.

On receiving his medical degree Dr. Bowditch went abroad to study physiology. He was fortunate in coming into relations with two of the foremost physiologists in the last century, — Claude Bernard, in Paris, and Carl Ludwig, in Leipzig. Bernard did not influence him nearly so much as did Ludwig, who, besides being an enthusiastic investigator, was a most warm-hearted and lovable character. In the Leipzig laboratory at that time and shortly afterwards was a remarkable group of young men, including Mosso, Kronecker, Cyon, Brunton, and Lankester. These men who, as the years passed, took high positions in Switzerland, Italy, France and England, maintained throughout their lives the close friendships established by the delightful days in Leipzig.

Under Ludwig's leadership Dr. Bowditch experienced for the first time the joy and the thrill of scientific search and discovery. As a result he published two papers, one of them, on peculiarities of the activity of cardiac muscle, destined to be famous. In that paper he reported that cardiac muscle differs from other muscle in contracting each time with its full force or not at all — following the "all-or-nothing" law, as it has been called, — and further, that repeated uniform stimulation causes a "treppe" effect, an increasing vigor of contraction, so that the record of the response rises like a stair. The generalization that activity of an organ is favorable to further activity has grown out of this observation on the heart, made forty years ago.

In September, 1871, Dr. Bowditch returned to Boston from Leipzig, bringing with him, as his wife, Selma Knauth, the daughter of Franz Theodor and Fanny Elizabeth Knauth, at whose home he, with other American students, had been hospitably welcomed. On his return he became Assistant Professor of Physiology in the Harvard Medical School, and in October, 1871, began his service. Previous to that time Oliver Wendell Holmes had given, at the end of his lectures on anatomy, a half-dozen lectures on the functions of the body. In medical circles in Boston at that period there was little appreciation of the ideals of the investigator in scientific medicine; there was only one laboratory and that was the dissecting room. Dr. Bowditch had to create not only his own laboratory, but also his own atmosphere. He secured for his uses two rooms in the attic of the Medical School building on North Grove Street, and fitted them with physiological apparatus. That was the first physiological laboratory, for the use of students, in the United States.

These rooms might perhaps be better designated the first laboratory for experimental medicine established in this country, for every phase of experimental medical work was there represented. Charles S. Minot carried on investigations in general biology, J. Ott in experimental pharmacology, J. C. Warren in experimental pathology, G. Stanley Hall and W. F. Southard in experimental psychology, O. K. Newell in experimental surgery, and W. P. Lombard, J. J. Putnam assisted by William James, C. S. Minot, G. M. Garland, C. H. Williams, J. W. Warren, F. H. Hooper, and F. W. Ellis in physiological researches. The hospitality of the laboratory was unbounded; indeed the first careful work in bacteriology in this country was begun there. With Dr. Bowditch's inspiration every scientific interest of a complete modern medical school was stimulated. From the start the emphasis was on productive scholarship. In the preface to the first collection of papers published from the laboratory the announcement was made that the contributions were presented in a volume, "not from any exaggerated idea of their value and importance, but with the hope that, by calling attention to the facilities offered in the laboratory for original research, a greater number of workers may be encouraged to attempt the investigation of the many physiological problems now pressing for a solution."

Dr. Bowditch's own investigations were almost as varied as those of the men who worked with him. His training in the Leipzig school, which was characterized by the application of physical principles to bodily processes, gave full play to his unusual inventive faculties. Simultaneous records on a single kymograph were suggested by him while in Leipzig, and this suggestion is said to have first directed the attention of Ludwig to the young American's abilities. The contriving of the Bowditch clock was another product of the Leipzig experience. In the Harvard laboratory the invention of a new form of induction apparatus, with the secondary coil turning at various angles to the primary, and the devising of a new form of plethysmograph to register changes in the volume of organs, testify to his ingenuity.

That apparatus is a means to an end, however, he never forgot, and for many years he was engaged in researches of striking range and originality. Besides his investigations of the peculiar functions of cardiac muscle, he demonstrated the indefatigability of nerves, made interesting observations on the knee-jerk and conditions affecting it, performed experiments which showed the force of ciliary motion, studied the effects of different rates and intensities of stimulation on the action of vaso-motor nerves, conducted an exhaustive examination of the rate of growth of school-children, and collaborated with workers in still other fields of physiological science.

In the teaching of physiology Dr. Bowditch's instruction was marked by wide learning, clear discussion of controverted questions, cautious inference when convincing demonstration was not forthcoming, and orderly exposition. His lectures were unusually well illustrated, by methods which made lasting impressions. The sending of students to original sources for material for physiological theses was a notable contribution to educational procedure. The conferences at which the theses were read and the weekly quizzes were delightfully informal and conversational. For thirty-five years Dr. Bowditch continued his helpful relations to students of the Harvard Medical School. In 1876 he was made Professor of Physiology; and in 1903, when the George Higginson Professorship of Physiology was established, he was appointed first occupant of the chair.

Further service to physiology he performed by assisting to found the American Physiological Society, of which he was the second president. The character of the Society as an association of active investigators is largely the result of his initiative. His example and his frank appreciation of original work as it was newly reported at meetings of the Society were an important source of encouragement to young men beginning physiological investigation. The American Journal of Physiology also received his support from the time it was first suggested. Both the American Physiological Society and its journal have been of incalculable value in stimulating physiological and biochemical research in this country.

Dr. Bowditch's relations to medicine were not, however, confined to the advancement of physiology alone, taken even in the wide sense in which he regarded it. His first larger allegiance was to the Harvard Medical School. He was prominent in the movement during the late 70's to secure a new home for the School, and helped to obtain the necessary funds for the building occupied from 1882 to 1906, at the corner of Boylston and Exeter Streets. In 1883 he was persuaded that as Dean he would have opportunities of increased usefulness to medicine. During the next ten years while he held the deanship, important changes were brought to pass in medical education. Bacteriology was introduced as a regular study, a pioneer venture under his leadership. The four years' required course was adopted, another forward step which the Harvard Medical School was among the first to take. A further important innovation was the calling of men from other universities to assume positions in the School, — Dr. W. H. Howell came from Michigan to be Associate Professor of Physiology, and Dr. W. T. Councilman came from Johns Hopkins to be Professor of Pathology. Although Dr. Bowditch resigned from the deanship in 1893, he never ceased to be interested in the larger problems of medical instruction. During his later years he became a strong advocate of greater freedom of election in medical study. Two of his addresses, "Reform in Medical Education" and "The Medical School of the Future," are admirable statements of the principles of sound teaching.

He was one of the first to foresee the necessity of enlarging the Harvard Medical School and bringing it into closer relations to hospitals. He became an enthusiastic promotor of the plan to make an important medical center of the Longwood Group of medical institutions, and with Dr. John Collins Warren, was astonishingly successful in securing funds for the realization of that great vision.

Among the most valuable of the larger services to medicine which Dr. Bowditch performed was his defense of animal experimentation against repeated attempts to pass unreasonable legislative restrictions. The success of the medical profession in Massachusetts in overcoming the misguided zeal of ignorant agitators has given heart to the profession elsewhere. The methods which were here used in meeting the petitioners for hostile legislation are now being employed in other states. In an address on "The Advancement of Medicine by Research" Dr. Bowditch clearly exposed the methods of the antivivisectionists, and presented an illuminating statement of the great benefits which had been secured for mankind by animal experimentation.

In spite of his large interest in medical research and education, he maintained useful relations with public affairs non-professional in character. From 1877 to 1881 he was a member of the Boston School Committee. He was President of the Boston Children's Aid Society and helped to broaden its scope and importance. Between 1895 and 1902 he was happily engaged as trustee of the Boston Public Library. As a member of the Committee of Fifty on the Alcohol Problem, he submitted a report on the character of public school instruction regarding the effect of alcohol, and urged that that instruction should be made to accord with scientific fact.

For his important services he was widely honored. He was elected a fellow of the American Academy of Arts and Sciences in 1872. During the year 1877 he was its Recording Secretary, and from 1881 to 1883 a member of its Council. For twenty-two years he served on the Library Committee. He was also a member of the American Philosophical Society of Philadelphia, the National Academy of Sciences, and many other scientific bodies in this country. The Royal Society of Medicine and Natural Science of Brussels, the Academy of Science of Rome, and other foreign societies enrolled him among their members. The University of Cambridge made him Doctor of Science in 1898; and Edinburgh (1898), Toronto (1903), Pennsylvania (1904), and Harvard (1906) gave him the degree of Doctor of Laws.

Everyone who came in close contact with Dr. Bowditch was impressed by his rare combination of sure and sober judgment with vigorous will and readiness of action, — qualities which made him a natural leader. Furthermore his mind was fertile with ingenious and effective ways to secure the accomplishment of worthy ends. He was eminently single-minded; the matter in hand was always the important matter to be attended to. Persons who knew him well recall that he seldom spoke of the past, almost never of his experiences in the War, and rarely of his earlier researches. The forward look to the fulfilment of plans already started was characteristic of him to the last. These qualities of energetic leadership were tempered by unfailing courtesy, fairness, and good-will, and warmed by a delightful sense of humor. These lovable characteristics brought to him the friendship and lifelong devotion of the foremost men of medical science, as well as of his students and his associates in various activities. Friendship was to him a blessing to be cultivated. He rejoiced in having his friends with him at his beautiful home in Jamaica Plain, and in his summer camp in the Adirondacks, or in going to be with them. Comrades of his Leipzig days visited him thus, as well as Sir Michael Foster, Professor Mosso, and Professor Waller. And he frequently renewed associations with them in Europe.

Although during the years from 1906 to his death Dr. Bowditch's vigor and activity were more and more limited by the advances of a paralysing disease, his mind remained clear and he continued much interested, almost until the last, in plans he had outlined for the Medical School. In spite of the growing physical weakness which must have clouded for a time his energetic spirit during those years, Dr. Bowditch's life as a whole must be regarded as essentially a happy life, happy in durable achievements, happy in the affections of close friends, and in the tender devotion of his family. When it became necessary for him to face the inevitable, he accepted his fate with cheerful patience and with gentlest consideration for those who ministered to him. Perhaps as the end approached he recalled the words which he wrote in a memorial to his friend, Theodore Lyman, years before: —

"I remember, Mr. President, when a young man, looking around among the men of my generation and considering whose lot in life seemed to me, on the whole, the most enviable. I came to the conclusion that Theodore Lyman was, of all my acquaintances, the man for whom the future seemed to hold out the brightest promise.

"In vigorous health, with a personality — physical, mental, and moral — which endeared him to all who came in contact with him, happily married, with instincts and powers which led him to the highest callings, to the service of his country in the field and in legislative halls, with tastes for the study of the natural sciences and abundant means to gratify them, there seemed to be nothing lacking to make his life an ideally happy one.

"Then, when the shadow of a slow, insidious disease fell upon him it seemed for a time as if his life were but to afford another illustration of the old Greek saying that no man is to be judged happy before his death; but when I saw how bravely he met the advances of his enemy, and with what courageous cheerfulness he interested himself in the pursuits of his friends and in the active life around him in which he could no longer share, I could not help feeling that a happiness was reserved for him higher than any of which the Greek philosopher had dreamed or I, as a young man, had formed a conception — the happiness of knowing that by the force of his example he had helped to raise those who came under its influence to a higher and nobler life."

W. B. Cannon.

List of Publications by Dr. H. P. Bowditch.

1871 Über die Eigenthümlichkeiten der Reizbarkeit, welche die Muskelfasern des Herzens zeigen. Arb. a. d. physiol. Anst. zu. Leipz., 1871, 139–176. Also: Ber. d. k. sachs. Gesellsch. d. Wissensch. Math. phys. Kl., 1871

1872 Über die Interferenz des retardirenden und beschleunigenden Herznerven. Arb. a. d. physiol. Anst. zu. Leipz., 1872. 259–280.

1873 The lymph spaces in fasciæ. Proc. Am. Acad., Feb. 11, 1873.

1874 Dr. Bowditch and Minot, C. S. The influence of anæsthetics on the vasomotor centres. Boston M. & S. J., 1874, xc, 493–498.

1875 A new form of inductive apparatus. Proc. Am. Acad., Oct. 12, 1875.

1876 Force of ciliary motion. Boston M. & S. J., 1876, xcv, 159–164.

1877 The growth of children. 8th Annual Report of the State Board of Health of Mass., Boston, 1877, 275.

1878 Does the apex of the heart contract automatically? J. of Physiol., 1878, i, 104–107.

1879 The growth of children, a supplementary investigation, with suggestions in regard to methods of research. 10th Annual Report of the State Board of Health of Mass., Boston, 1879, 33–62.

1879–80 Dr. Bowditch and Garland, G. M. The effect of the respiratory movements on the pulmonary circulation. J. of Physiol., 1879-80, ii, 91–109.

1879 A new form of plethysmograph. Proc. Am. Acad., May 14, 1879.

1879–80 Physiological apparatus in use at the Harvard Medical School. J. of Physiol., 1879-80, ii, 202–205.

1881 The relation between growth and disease. Trans. Am. Med. Ass'n., 1881, xxxii, 371–377.

1880–82 Dr. Bowditch and Southard, W. F. A comparison of sight and touch. J. of Physiol., 1880-82, iii, 232–245. Also abstract of same.

1880–82 Dr. Bowditch and Hall, G. S. Optical illusions of motion. J. of Physiol., 1880–82, iii, 297–307. Abstract of above.

1882 Dr. Bowditch and Harris, F. A. On the collection of data at autopsies. Boston M. & S. J., 1882, cvii, 365.

1883 Dr. Bowditch and Warren, J. W. Plethysmographische Untersuchungen über die Gefässnerven der Extremitäten. Centralbl. f. d. med. Wissensch., 1883, xxi, 513.

1885 Note on the nature of nerve-force. J. of Physiol., 1885, vi, 133–135.

1886 What is nerve-force? Proc. Am. Ass'n. Adv. Sc., 1886, xxxv, 237–246.

1886 Dr. Bowditch and Warren, J. W. Plethysmographic experiments on the vasomotor nerves of the limbs. J. of Physiol., 1886, vii, 416–450.

1886 Vaso-motor nerves of the limbs. Abstract of foregoing paper. Proc. Am. Ass'n. Adv. Sc., 1886, xxxv, 270.

1887 The action of sulphuric ether on the peripheral nervous system. Am. J. Med. Sc., Apr., 1887.

1888 The reinforcement and inhibition of the knee-jerk. Boston M. & S. J., 1888, cxviii, 542–543.

1890 Dr. Bowditch and Warren, J. W. The knee-jerk and its physiological modifications. J. of Physiol., 1890, xi, 25–64.

1890 The physique of women in Massachusetts. 21st Annual Report of the State Board of Health of Mass., 1889, Boston, 1890, 287–304.

1890 Über den Nachweis der Unermüdlichkeit des Säugethiernerven. Arch. f. Physiol., 1890, 505–508.

1890 The growth of children studied by the method of percentile grades. Internat. Med. Congress, Berlin, 1890.

1891 The growth of children studied by Galton's method of percentile grades. 22d Annual Report of the State Board of Health of Mass., Boston, 1891, 479–522.

1894 Are composite photographs typical pictures? McClure's Mag. Sept., 1894.

1895 A card catalogue of scientific literature. Science, Feb. 15, 1895.

1896 The advancement of medicine by research. Boston M. & S. J., 1896, cxxxiv, 577–581. Proc. of Mass. Med. Soc., 1896.

1897 Memoir of Charles Edouard Brown-Sequard. (1817–1894.) Read before the National Academy, April, 1897.

1898 Reform in medical education. Science, Dec. 30, 1898; and Boston M. & S. J., 1898, cxxxix, 643–646.

1898 Apparatus for illustrating movements of the eye. Boston Soc. Med. Sci., June, 1898.

1900 The medical school of the future. Trans. of the 5th Congress of the American Physicians and Surgeons, May, 1900; and Philadelphia Medical Journal, May 5, 1900.

1904 The study of physiology. Univ. of Pa. Medical Bulletin, June 1904.

Two Resident Fellows have resigned.

New members elected are: — Resident Fellows, six; Associate Fellows, one.

The roll of the Academy now includes 194 Resident Fellows, 76 Associate Fellows, and 55 Foreign Honorary Members.